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NEW GENERA AND HIGHER GROUPS OF UNSTALKED  
CRINOIDS.

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The recent increase of our knowledge in regard to the interrelations of the various genera and species of comatulids has indicated that there are a number of well-defined groups which it would be advantageous to recognize in nomenclature in order that their relationships may be the more readily understood.

In my work upon the phylogenetic significance of the syzygy I brought out the reason why the syzygies are always associated with the *oblique* type of muscular articulation while with the *straight* type only synarthries ("bifascial articulations") are found. Two important exceptions to this rule are found in the Comasteridae in the genera *Comaster* and *Comatula*; in the former all the non-muscular articulations, except the second, occurring in the division series, and the first articulation of the free arm, are supposed to be syzygies, while in the latter the primibrachs and secundibrachs, as well as the first two brachials, are always described as syzygially united. Now according to the phylogeny of the syzygy as I understand it the occurrence of syzygies proximal to the third brachial of the free arm is quite anomalous and can not be logically explained. These two genera, therefore, have caused me considerable uneasiness, and it was with some impatience that I awaited material available for dissection in order to confirm or to disprove the anomalous structure of the animals. I have now at hand a large series of *Comatula pectinata* and *Comaster novæguineæ* from the Philippine Islands. In *Comatula pectinata* I find that the supposed syzygies between the primibrachs and first two brachials are in reality synarthries, though the union is very close and certainly appears syzygial in

an external view. Dr. P. H. Carpenter's "Solaris group" of "Actinometra," therefore, is seen to be identical with his "Echinoptera group," provided that the other species agree with *C. pectinata* in structure, which they probably do. In *Comaster* I likewise found no syzygies proximal to the free arm; but here the synarthries, extremely close as in *Comatula*, have secondarily taken on a more or less irregular concentric or radiating, or a combination of both, surface sculpture, which is never so perfect as to conceal entirely the fundamental dorso-ventral synarthrial ridge. This type of articulation, curiously like a syzygy, though directly derived from the totally different synarthy, I propose to call a *pseudo-syzygy*. The Comasteridae are now shown to contain no exceptions to the rule that syzygies are associated only with *oblique* muscular articulations, synarthries only with *straight* muscular articulations, though we still have, as our now single exception, the strange family Zygometridæ.

The large group Comatulida may be divided into three sub-orders as follows:

#### Comatulida Innatantes.

Pelagic comatulids in which the basals are not metamorphosed but form an integral part of the body wall; the infrabasals are not united with the central plate, but usually form part of the body wall; occasionally, through individual variation, they are absent; there is no evidence of attachment at any stage, so that their central apical plate may possibly represent the dorso-central instead of the centro-dorsal of other comatulids. The plates of the calyx, which is very large and more or less globular, are very thin.

Included families.—*Marsupitidæ*; *Uinacrinidæ*.

#### Comatulida Oligophreata.

Bottom inhabiting comatulids, stalked when young; basals metamorphosed into a rosette; infrabasals unknown; cavity in the centro-dorsal containing the chambered organ and overlying structures very small; a well-developed neurilemma is present, at least in some forms; the disk is more or less studded or even completely covered with large calcareous concretions or plates; the pinnules, at least the lower, are wholly or in part prismatic, and are composed of short segments; the post-radial series usually divide two or more times.

Included families.—*Comasteridæ*; *Zygometridæ*; *Himerometridæ*; *Colobometridæ*; *Thalassometridæ*; *Tropiommetridæ*.

#### Comatulida Macrophreata.

Bottom inhabiting comatulids, stalked when young; basals usually metamorphosed into a rosette; infrabasals have been detected in two species, where they fuse with the centro-dorsal; cavity in the centro-

dorsal containing the chambered organ and overlying structures large; there is no neurilemma; the disk is naked, or studded with minute plates which may fuse into larger plates in the interradial angles; pinnules all cylindrical or more or less flattened, and slender, and with very long segments; the post-radial series do not divide, or divide but once.

Included families.—*Antedonidæ*; *Atelecrinidæ*; *Pentametrocrinidæ*.

The family Comasteridæ falls naturally into the three following sub-families:

**Capillasterinæ** sub-fam. nov.

The distal cirrus segments bear dorsal processes; in genera containing species with more than ten arms the arm division is extraneous or compound, never interpolated.

Included genera.—*Nemaster*; *Capillaster*; *Neocomatella*; *Comatella*; *Comatilia*; *Leptonemaster*; *Comissia*.

**Comactiniinæ** sub-fam. nov.

The cirrus segments are entirely smooth dorsally; the segments of the genital pinnules are extremely short and more or less produced distally; more than ten arms are rare; when present the division series are interpolated, and of two ossicles.

Included genera.—*Comatula*; *Comactinia*; *Cominia*.

**Comasterinæ** sub-fam. nov.

The distal cirrus segments bear dorsal processes; two or more division series are present, always interpolated; a few at least of the division series always consist of four ossicles.

Included genera.—*Comaster*; *Comanthus*.

The family Himerometridæ, as previously understood, may be advantageously sub-divided as follows:

**Pontiometridæ** fam. nov.

Oligophreate comatulids in which the oral pinnules are greatly elongated, slender, and flagellate, without combs distally; the mouth is approximately central, the anal tube slender and very long; the articular faces of the radials are entirely and widely separated and as deep as broad, well rounded; the central canal bisects the transverse ridge dorso-ventrally; the transverse ridge bears on each side of the central canal a triangular ligament pit which may be called a *fulcral ligament fossa*; there are no muscular fossæ on the radial faces.

Included genus.—*Pontiometra*.

**Himerometrinæ** sub-fam. nov.

The second division series (usually present) is always of four ossicles, at least in part; the brachials are very, often excessively, short.

Included genera.—*Amphimetra*; *Himerometra*; *Craspedometra*; *Heterometra*.

**Stephanometrinx** sub-fam. nov.

The brachials are of moderate length, wedge-shaped; at least one of the proximal pinnules is very stiff, sharp-pointed, and spine-like, with comparatively few segments; the division series and first two brachials have lateral projections, and are well separated; second division series are always present, and, like all the other division series, of two components.

Included genera.—*Oxymetra*; *Stephanometra*.

**Mariametrinx** sub-fam. nov.

The brachials and division series are as in the Stephanometrinx, but the division series are in close lateral apposition, without lateral processes; the elongate proximal pinnules are enlarged, but are flagellate, at least distally, and have comparatively numerous segments.

Included genera.—*Mariametra*; *Dichrometra*.

The family Antedonidae falls naturally into six sub-families, as follows:

**Antedoninx** sub-fam. nov.

The few cirri are short, with few segments, irregularly disposed on a low-hemispherical centro-dorsal; an opposing spine is present on the penultimate cirrus segment.

Included genera.—*Antedon*; *Mastigometra*; *Compsometra*; *Iridometra*.

**Perometrinx** sub-fam. nov.

One or more of the lower pinnules is absent; the cirri, which have numerous segments, shorter distally than proximally, are numerous, and are evenly distributed, closely crowded, on a hemispherical or more or less conical centro-dorsal.

Included genera.—*Perometra*; *Erythrometra*; *Hypalometra*.

**Zenometrinx** sub-fam. nov.

The cirri, which are long with numerous segments, are arranged in definite columns, usually well separated, at least laterally, on a more or less elongate conical centro-dorsal to which they are weakly attached; some of the lower pinnules may be absent.

Included genera.—*Zenometra*; *Psathyrometra*; *Leptometra*; *Adelometra*; *Balanometra*.

**Heliometrinx** sub-fam. nov.

The numerous cirri, which are slender to moderately stout, have numerous segments which are much shorter distally than proximally, and are evenly distributed over and closely crowded on a large hemispherical or rounded conical centro-dorsal; all the pinnules are present.

Included genera.—*Promachocrinus*; *Heliometra*; *Trichometra*; *Hathrometra*; *Isometra*.

**Thysanometrinx** sub-fam. nov.

The first pinnule is composed of numerous squarish or round segments, but in one genus is much reduced in length; the following pinnules are

long, at least as long as the first, with elongated segments; the cirri are long, compressed, deciduous, the distal segments slightly or not at all shorter than the proximal; no dorsal spines; opposing spine absent, rarely feebly developed.

Included genera.—*Eumetra*; *Thysanometra*; *Coccometra*.

**Bathymetrinæ** sub-fam. nov.

The second pinnule bears a genital gland and, with the following, is as long as or even much longer than the first; the cirri are short with few segments.

Included genera.—*Bathymetra*; *Thaumatometra*.

The following new genera are well worthy of recognition:

FAMILY COMASTERIDÆ.

SUB-FAMILY CAPILLASTERINÆ.

**Neocomatella** gen. nov.

*Comatella* (part) 1908. A. H. CLARK, Smiths. Miscell. Coll. (Quarterly Issue), vol. 52, p. 207.

This is the Atlantic representative of the Pacific genus *Comatella* from which it differs in its fewer arms and much longer brachials which are triangular and about as long as broad instead of short wedge-shaped or discoidal. *Neocomatella* holds approximately the same relationship to *Comatella* as *Nemaster* does to *Capillaster*.

*Genotype*.—*Antedon alata* Pourtalès, 1878.

FAMILY TROPIOMETRIDÆ.

**Pterometra** gen. nov.

*Ptilometra* (part) 1908. A. H. CLARK, Smiths. Miscell. Coll. (Quarterly Issue), vol. 52, part 2, p. 224.

This genus appears to represent the Australian genus *Ptilometra* in the East Indies; it differs markedly from that genus in the regular distribution of the cirri, these being arranged in ten definite columns, and in the much more slender pinnules which have longer segments.

*Genotype*.—*Ptilometra trichopoda* A. H. Clark, 1908.

FAMILY ANTEDONIDÆ.

SUB-FAMILY ZENOMETRINÆ.

**Balanometra** gen. nov.

*Perometra* (part) 1907. A. H. CLARK, Smiths. Miscell. Coll. (Quarterly Issue), vol. 50, p. 357.

The cirri are arranged in ten well-separated and definite columns on a conical centro-dorsal; the first two pinnules are absent.

*Genotype*.—*Antedon balanoides* P. H. Carpenter, 1888.

